In re Patent Application of

Nasli-Bakir et al

Application No. 09/700,747

Filed: November 20, 2000

For: METHOD OF APPLICATION

Attorney Docket No. 000600-036

Confirmation No. 4239

Group Art Unit: 1762

Examiner: William P. Fletcher III

APPEAL BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This appeal brief is filed in support of the Notice of Appeal filed August 20, 2006 and further to the decision of the Pre-Appeal Brief Conference mailed September 27, 2006.

Table of Contents

I. Real Party in Interest

The real party in interest is Casco Nobel, AB.

II. Related Appeals and Interferences

There are no related appeals or interferences connected with this appeal.

III. Status of Claims

Claims 1-38 and 47-55 have been cancelled, and claims 39-46 and 56-95 stand finally rejected and are appealed.

IV. Status of Amendments

There are no outstanding amendments.

V. Summary of Claimed Subject Matter

The claimed invention relates to a method of applying an amino resin gluing system to a substrate. As claimed in claim 39, the method includes the steps of feeding an amino resin component to at least a first orifice, feeding a hardener component to at least a second orifice, and discharging the resin and hardener through their respective orifices in the form of strands or spray onto the substrate. The discharged components remain physically isolated from each other until at least one of the components contacts the substrate. The hardener is a volatile acid and is either free from filler or includes filler in an amount of less than 20% by weight. Appellants have found that when the amount of filler in the amino resin adhesive is kept below 20%, as claimed, delamination is greatly reduced. This result was quite unexpected, and is neither taught nor suggested by the prior art. Example 1 of the specification demonstrates and quantifies this unexpected result.

The following table maps the claims to the specification (WO 99/67028, attached as Appendix XI.)

39. A method of applying an amino resin gluing system to a substrate, comprising the steps of:	Abstract; page 1, lines 2-4
(a) feeding an amino resin component to at least a first orifice;	Page 6, lines 4-15
(b) feeding a hardener component to at least a second orifice; and	Ibid
(c) discharging said resin and hardener components through said respective first and second orifices in the form of strands or as a spray onto the substrate, said discharged components remaining physically isolated from each other until at least one of said components contacts said substrate;	"This device enables application of the components of a gluing system, such as a resin and a hardener, onto a substrate, wherein the later applied strands of one component are applied at a certain distance...in relation to the previously applied strands of the other component(s)." page 6, lines 11-15

wherein the hardener comprises a volatile acid and is either free from filler or includes filler in an amount of less than 20% by weight.	"The hardener can be free from filler..." page 3, line 20; "up to 50% by weight of a volatile acid..." page 3, line 24; "...suitably less than 20% by weight of a filler..." page 3, line 26.
60. A method of separate application of resin and hardener components of an amino resin gluing system onto a substrate, in the form of strands,	Abstract
wherein the hardener comprises a volatile acid and is either free from filler or comprises filler in an amount of less than 20% by weight,	"The hardener can be free from filler..." page 3, line 20; "up to 50% by weight of a volatile acid..." page 3, line 24; "...suitably less than 20% by weight of a filler..." page 3, line 26.
and wherein the resin and hardener components are discharged from different hollow members each having a plurality of orifices,	"...a device comprising a unit of at least two hollow members, at least one member for each component, provided with a number of orifices in each member..." page 5, lines 30-32.
the orifices of one said hollow member being either aligned in, or parallel displaced in, a machine direction in relation to the corresponding orifices of the other said hollow member.	"...wherein each of the orifices of one hollow member are aligned in the machine direction in relation to the corresponding orifices of the other hollow member(s)." page 5, lines34-36; "...each of the orifices of one hollow member are parallel displaced..." page 6, lines 9-11.
70. A method of separate application of resin and hardener components of an amino resin gluing system onto a substrate, in the form of strands,	Abstract
wherein the hardener comprises a volatile acid and is either free from filler or comprises filler in an amount of less than 20% by weight,	"The hardener can be free from filler..." page 3, line 20; "up to 50% by weight of a volatile acid..." page 3, line 24; "...suitably less than 20% by weight of a filler..." page 3, line 26.
and wherein the strands of resin and the strands of hardener do not overlap.	"...wherein the later applied strands of one component are applied at a certain distance...in relation to the previously applied strands of the other component(s)..." page 6, lines 13-15.
76. A method of separate application of resin and hardener components of an amino resin gluing system onto a substrate,	Abstract

wherein the hardener comprises a volatile acid and a thickener, and is either free from filler or comprises filler in an amount of less than 20% by weight,	"The hardener can be free from filler..." page 3, line 20; "...suitably less than 20% by weight of a filler..." page 3, line 26.
and wherein the components of the gluing system are applied in the form of strands or by means of spraying, or any combination thereof, in optional order of application.	"... the resin and hardener components can be applied in any order in the form of strands or by means of spraying...the hardener component can be applied by means of spraying and the resin in the form of strands..." page 4, lines14-17.
87. A hardener composition for use in a method of separate application of resin and hardener components of an amino resin gluing system onto a substrate,	Abstract
wherein the hardener is either free from filler or comprises a filler in an amount of less than 20% by weight and a volatile acid,	"The hardener can be free from filler..." page 3, line 20; "up to 50% by weight of a volatile acid..." page 3, line 24; "...suitably less than 20% by weight of a filler..." page 3, line 26.
wherein the components of the gluing system are applied in the form of strands or by means of spraying, or any combination thereof, in optional order of application.	"... the resin and hardener components can be applied in any order in the form of strands or by means of spraying...the hardener component can be applied by means of spraying and the resin in the form of strands..." page 4, lines14-17.
94. A method of separate application of resin and hardener components of an amino resin gluing system onto a substrate,	Abstract
wherein the hardener comprises a volatile acid and a thickener,	"up to 50% by weight of a volatile acid..." page 3, line 24; "thickener" page 3, line 19
wherein the later applied strands of one component substantially overlap the corresponding previously applied strands of the other component,	"...wherein the later applied strands of one component are overlapping the previously applied strands of the other component(s)." page 6, lines 2-3.
wherein the hardener component is applied on top of the resin component,	"...in one embodiment...the hardener is applied on top of the resin strands..." page 5, lines 7-8.
wherein the volatile component of said hardener comprises formic acid in an amount of 10-30% by weight,	"...volatile acid...preferably 10-30%..." page 3, line 24; "formic acid" page 4, line 2.

and wherein the hardener is free from filler.	"The hardener can be free from filler..." page 3, line 20.

VI. Grounds of Rejection to be Reviewed on Appeal

The following is a concise statement of each ground of rejection presented for review.

1. Claims 39, 41-45, 56-59, 70-76, 78-82, 84-87, and 89-93 and 95 unpatentable under 35 U.S.C. §103 based on Andersson in view of Lehnert.

2. Claims 46, 83 and 88 unpatentable under 35 U.S.C. §103 based on Andersson in view of Lehnert, and further in view of Perciwall.

3. Claims 40 and 77 unpatentable under 35 U.S.C. §103 based on Andersson in view of Lehnert, and further in view of Menger.

4. Claims 60-64 and 66-69 unpatentable under 35 U.S.C. §103 based on Andersson in view of Lehnert and Toshio.

5. Claim 65 unpatentable under 35 U.S.C. §103 based on Andersson in view of Lehnert and Toshio, and further in view of Perciwall.

6. Claim 95 unpatentable under 35 U.S.C. §103 based on Andersson in view of Lehnert and Perciwall.

7. Claim 94 unpatentable under 35 U.S.C. §112, first and second paragraphs.

8. Claims 56, 57 and 58 unpatentable under 35 U.S.C. §103 based on Andersson in view of Lehnert. These claims are to be considered separately from the rejection of claims 39, 41-45, 59, 70-76, 78-82, 84-87, 89-93 and 95

The Examiner has rejected all of the claims based on the combination of Andersson (EP 0207024) in view of Lehnert (WO 89/05221). Some rejections also include one or more of Perciwall (EP 0016740), Menger (US 2,015,806) and Toshio (JP 61-040137) as additional secondary references. In addition, claim 94 has been rejected under 35 U.S.C. §112, first and second paragraphs.

A personal interview was conducted with Examiner Fletcher and his supervisor, Examiner Meeks, on October 11, 2005. At the interview, it was suggested that appellants prepare and file a Declaration under 37 CFR §1.132 based on the teaching of the primary reference of Andersson, in which data points regarding delamination were presented comparable to those in applicants' Example 1. In addition, it was suggested that the Declaration provide some rationale that amino resin adhesives other than that used in Example 1 would function in an equivalent manner. Appellants agreed to consider such a declaration. However, upon careful reconsideration, they have instead decided to appeal, on the basis that the Examiner has failed to establish a *prima facie* case of obviousness, and consequently no Declaration under 37 CFR §1.132 is necessary for a finding of patentability.

Some underlying issues are:

1) Whether phenol and amino resins are equivalent for use as conventional two component adhesives in the art of joining wood surfaces. The alleged equivalence of phenol and amino resins is the basis for the Examiner's citation of Lehnert; it is the "glue" holding together the Examiner's *prima facie* case of obviousness.

2) Even assuming, *arguendo*, the Examiner has established a *prima facie* case of obviousness, is it rebutted by the appellants' showing of unexpected results in the Examples of the specification?

VII. Argument

A. Claims 39, 41-45, 56-59, 70-76, 78-82, 84-87, and 89-93 and 95 unpatentable under 35 U.S.C. §103 based on Andersson in view of Lehnert

In the Office Action mailed January 14, 2005, page 7, the primary reference of Andersson is cited for teaching:

> a method of applying a two-component gluing system to a substrate in which the resin component and the hardener component are separately applied to the substrate in the form of separate, parallel strands [abstract]. The components are applied through a nozzle (i.e., orifice) [p.6, ll. 9-17]. The two components do not contact each other until the substrate surfaces are joined together [p. 6, ll. 15-17]....Although Andersson teaches application of the components from a nozzle, the reference does not specify whether it is the same nozzle or two separate, discrete nozzles. Both Perciwall and Andersson teach that pre-curing is undesirable because it necessitates frequent cleaning of the application apparatus [Perciwall: p. 1, ll. 9-21 and Anderson: p. 1]. Based on these teachings, it would have been obvious to one of ordinary skill in the art to apply each component from its own, individual, dedicated nozzle, so as to avoid fouling of the nozzle that would require cleaning.... [Andersson] does not teach that the gluing system is an amino resin gluing system or feeding the amino resin and hardener components to at least first and second orifices, respectively.

The Office Action goes on to say on page 11, as a justification for combining Andersson with Lehnert:

> The gluing system of Andersson is a formaldehyde-based adhesive, preferably resorcinol-formaldehyde or resorcinol-phenol formaldehyde [p. 2, ll. 5-11]. Lehnert teaches the equivalence of phenol and amino resins as conventional two-component adhesives in the art of joining wooden surfaces to form laminates, including condensation products of formaldehyde and urea and/or melamine [p. 1, ll. 28-31 and p. 3, l. 37-p. 4, l. 9].

This basis for combining Andersson and Lehnert can only be made in hindsight, as set forth below.

The Teaching of the Andersson Reference

Andersson relates to a method of gluing a laminate using curable adhesives whereby resin and hardener are applied separately to the joint area (e.g., laminate surface), preferably in the form of separate parallel strands. *See*, Abstract. The object of the Andersson invention is set forth on page 2, lines 5-11.

> The object of the present invention is to solve the problems of bleeding from glue joints, glued for example with the [sic] in the production of laminated wood conventionally used formaldehyde based adhesives, preferably resorcinol-formaldehyde adhesives or resorcinol-phenolformaldehyde adhesives, by using an adhesive wherein the resin component has a limited water dilutability.

Thus, the problem addressed by Andersson is unwanted bleeding of adhesive from the joint areas. This can occur, for example, if the laminate is used in an outdoor environment exposed to rain and the glue joints become wet. The reference explains the mechanism behind this phenomenon on page 1, line 30 *et seq*.

Briefly, the use of separate application of resin and hardener, while advantageous in many respects, has the disadvantage that the components may not be completely mixed. This is because mixing necessarily occurs only on the laminate surface after the separate adhesive components have been applied. If the components are not distributed evenly on the surface, then mixing is incomplete, resulting in unreacted liquid component within the glue joint. If the laminate becomes wet, the liquid resin will dissolve in the water and bleed out, causing discoloration.

The Andersson reference notes that this problem can be solved by employing an adhesive resin with "low water dilutability." Such a resin would not bleed out when the laminate becomes

wet because of lower water solubility. In discussing prior art attempts to lower water dilutability, Andersson mentions low pH at page two, lines 16-20.

> The water dilutability for the mentioned resin components can be lowered by lowering the pH of the resin to below 7.5 and suitability to a pH of 7. However, the resin will hereby get a low reactivity and this is less desirable in certain fields of use.

In the very next paragraph, the Andersson reference distinguishes its teaching from the prior art use of lowered pH.

> Improved results are achieved if the resin condensation, by means of a suitable selection of catalyst and other reaction conditions, is carried out in such a manner that a high content of methylene bridges and few free methyol groups are obtained. This resin has a low water dilutability, a high pH value and also high reactivity

The teaching of the Andersson reference can thus be summed up as follows.

1) Separate application of phenol resin and hardener can cause bleeding due to inadequate mixing.

2) The bleeding problem can be addressed by reducing water dilutability.

3) Water dilutability can be reduced by lowering the pH of the resin to below 7.5, but this is inadequate because reactivity is decreased.

4) Water dilutability can be reduced *without* lowering pH by suitable control of the reaction conditions of the phenol condensation reaction conditions.

The following conclusions can be drawn from the teaching of the Andersson reference.

1) Andersson is directed generally to the use of phenolic resins, and makes no mention of amino resins.

2) Andersson is directed *specifically* to particular condensation reaction conditions for phenolic resins in order to lower water dilutability.

3) Andersson specifically *teaches away* from the use of acidic conditions as a means for lowering water dilutability of phenolic resins.

The Teaching of the Lehnert Reference

Lehnert teaches a method for producing wood products such as plywood, and is particularly directed to an improved cold pressing technique for pre-pressing a package of veneer. The improvement is a reduction in formaldehyde emissions by lowering the ratio of formaldehyde to resin in the adhesive composition. Normally, a lower ratio cannot be used because it reduces cold tack, but in Lehnert, this is compensated for by the application of a secondary hardener along the edges of the veneer. The secondary hardener reacts quickly with the resin and holds the veneer together, eliminating the need for cold tack in the primary adhesive composition. The reference mentions that both phenol and amino resins can be used in the manufacture of plywood. See page 1, lines 28-31. The teaching of using a secondary hardener is applicable to "conventional" formaldehyde based, curable adhesives, including both phenol and amino resin adhesives. See page 3, line 37 to page 4, line 7.

No rationale for substituting an amino resin in the composition of Andersson

The Examiner provides no rationale for substituting an amino resin for the phenolic resin in Andersson. His only basis for such a substitution is the bare assertion in Lehnert that the resins are equivalent. However, conventional does not mean equivalent.

While Lehnert is being cited for establishing the "equivalence" of phenol and amino resins, *nowhere in the Lehnert reference is such an equivalence set forth.* Lehnert states merely that both phenol and amino resins are *conventional.* To argue that "conventional" means

"equivalent" strains the ordinary meaning of these words. Conventional in the present context means (from worldwebonline.com, an internet dictionary):

> 1) Following accepted customs and proprieties...
> 6) In accord with or being a tradition or practice accepted from the past...

The term equivalent, from the same source, is defined as:

> 1) A person or thing equal to another in value or measure or force or effect or significance etc.....
> 2) Being essentially equal to something....

Thus, phenol and amino resins may be "conventional" resins used in adhesives, and their use may be "in accord with or being a tradition or practice accepted from the past." They are not, however, "equal...in value or measure or force or significance..." The Lehnert reference itself refutes such an equivalence by establishing that phenol and amino resin systems are fundamentally *different* despite their conventionality. On page 4, lines 21-28, Lehnert states:

> When the adhesive is an amino resin the hardener can for example be an inorganic or organic acid...When the adhesive is a phenol resin the edges of the veneer layers can be coated with a basic compound.

If phenol and amino resins were "equivalent" or "essentially equal," they would not employ totally different chemistries, requiring hardeners with diametrically opposing properties, viz., acidic vs. basic. Thus Lehnert teaches that amino and phenolic resin adhesive systems are *different*, not equivalent, and use different hardeners. There is no teaching or suggestion in Lehnert that an amino resin could be substituted for the resorcinol or resorcinol-phenol resin in Andersson, or that a volatile *acid* hardener could also be substituted.

Substituting an amino resin for a phenolic resin would fatally undermine the teaching of Andersson

Quite apart from any teaching in Lehnert of equivalency, replacing the phenolic resin of Andersson with an amino resin would render the Andersson disclosure totally meaningless. As

noted above, Andersson is directed to specific conditions for producing a condensation reaction of resorcinol-formaldehyde adhesives or resorcinol-phenolformaldehyde adhesives. The resulting adhesive has a pH well above neutral, and indeed maintaining a high pH is one of the goals of Andersson. By substituting an amino resin for the resorcinol-based resin in Andersson, the entire teaching of specific reaction conditions in the Andersson reference must be ignored, since they are specific to resorcinol and cannot be applied to amino resins. Moreover, as Lehnert states, amino resins have an acid hardener, and acid conditions are contradictory to the Andersson teaching.

The Federal Circuit and its predecessor have long held that if a proposal for modifying the prior art in an effort to attain the claimed invention causes the art to become inoperable or destroys its intended function, then the requisite motivation to make the modification would not have existed. See, *In re Fritch*, 23 U.S.P.Q. 2d 1780, 1783 n.12 (Fed. Cir. 1992); *In re Ratti*, 123 U.S.P.Q. 349, 352 (C.C.P.A. 1959).

Here, the Examiner's proposed modification of Andersson clearly destroys the reference's intended function.

The Examiner provides no motivation for modifying Andersson

Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. *In re Napier*, 34 U.S.P.Q. 2d, 1782,1784 (Fed. Cir. 1996). The mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification. *In re Laskowski*, 10 U.S.P.Q. 2d 1397,1399 (Fed. Cir. 1989); *In re Gordon*, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984).

Thus even if substituting an amino resin in Andersson did not destroy the reference's intended function, the Examiner must provide a motivation for the proposed substitution. He has presented no such evidence of motivation, relying solely on the notion of "equivalence" of amino and phenolic resins.

The Examiner contradicts his own rationale for equivalency

While the Examiner argues that two different types of resin, phenol and amino, are equivalent, he simultaneously maintains that resins of the *same* type are *not* equivalent to each other, since he asks appellants to "provide some rationale for the position that amino resins other than that in Example 1 function in an equivalent manner." [*See*, Interview Summary Record of October 13, 2005]. The Examiner cannot have it both ways. He cannot argue on the one hand that resins of *different* types (phenol and amino) are equivalent, and on the other hand argue that resins of the *same* type (amino) are *not* equivalent and require appellants to prove otherwise.

If there is any equivalency in Lehnert, it is that the described method of applying a hardener to the edges of a laminate can be used with conjunction with various "conventional" resin systems. However, this "equivalency" holds only in conjunction with other necessary process conditions that are completely contradictory to both Andersson and appellants' claimed invention.

For example, Andersson teaches that pre-curing is undesirable because it necessitates frequent cleaning of the application apparatus, and therefore, according to the Examiner, each component is added on its own (*See*, page 7 of January 14, 2005 Office Action, *supra.*) Yet Lehnert requires *mixing* of resin and hardener in the applied adhesive system (Page 4, lines 5-21).

Example 1 of appellants' specification demonstrates unexpected results

Even assuming, *arguendo*, that the combination of Andersson and Lehnert did establish a *prima facie* case of obviousness, such obviousness is rebutted by the showing of unexpected results in Example 1 of the specification. Neither Andersson nor Lehnert recognizes the unexpected result of lower delamination when the amount of filler is below 20% in the adhesive. The Examiner requires a comparison of appellants' invention with that of Andersson. However, Andersson provides no teaching of the significance of filler levels on delamination rates. The Board of Appeals has long held that the requirement for comparing to the closest prior art

precludes the USPTO from requesting tests comparing the invention to subject matter not taught in the prior art. *Ex parte Westphal,* 223 U.S.P.Q. 630 (Bd. App. 1983).

B. Claims 46, 83 and 88 unpatentable under 35 U.S.C. §103 based on Andersson in view of Lehnert, and further in view of Perciwall

Perciwall is cited for teaching the equivalency of formic acid with various other acids. However, the above noted defects in the combination of Andersson and Lehnert are not overcome by the addition of Perciwall. Hence even if it were established that formic acid is "equivalent" to other acids within the context of the claimed invention, the Examiner has still failed to establish a *prima facie* case of obviousness of claims 46, 83 and 88.

C. Claims 40 and 77 unpatentable under 35 U.S.C. §103 based on Andersson in view of Lehnert, and further in view of Menger

As with Perciwall, the addition of Menger fails to overcome the above notes defects in the combination of Andersson and Lehnert. Menger is cited for teaching separate application of resin and hardener. However, this is inconsistent with the teaching of Lehnert, which requires mixing. If references are inconsistent, they "teach away" from each other. Such teaching away leads a person of ordinary skill in a direction divergent from the path that was taken by the applicant. *Tec Air, Inc. v. Denso Mfg. Mich. Inc.*, 52 U.S.P.Q.2d 1294, 1298 (Fed. Cir. 1999). The examiner had yet to explain the inconsistency in the combined teaching. Hence claims 40 and 77 are patentable despite the addition of Menger.

D. Claims 60-64 and 66-69 unpatentable under 35 U.S.C. §103 based on Andersson in view of Lehnert and Toshio

Toshio is cited for teaching the application of adhesive components in strands. Again, however, its combination with Andersson and Lehnert does not address the above noted defects inherent in combining these two references. Furthermore, the Examiner has failed to explain the inconsistency of Toshio's separate strand application of components with Lehnert's required *mixing* of components. Hence claims 60-64 and 66-69 are patentable over this combination of references.

E. Claim 65 unpatentable under 35 U.S.C. §103 based on Andersson in view of Lehnert and Toshio, and further in view of Perciwall

The above noted defects in the combination of Andersson and Lehnert are not overcome by the addition of Perciwall and Toshio. Moreover, Toshio's separate application of strands is inconsistent with Lehnert's teaching of mixing, as noted above. Hence claim 65 is not rendered obvious by the combined teaching of these references.

F. Claim 95 unpatentable under 35 U.S.C. §103 based on Andersson in view of Lehnert and Perciwall

Despite the addition of Perciwall, the above noted defects in the combination of Andersson and Lehnert are not overcome by the addition of Perciwall. Hence claim 95 is not rendered obvious by the combined teaching.

G. Claim 94 unpatentable under 35 U.S.C. §112, first and second paragraphs

Claim 94 is rejected as being indefinite, the Examiner alleging that there is no support in the application as filed for applying the hardener on top of the resin. Support can be found in the following passages from page 2 of the PCT application, beginning at line 21.

> In the method, the resin component is preferably applied first in the form of strands, whereupon the hardener is applied in the form of strands.....the later applied strands may overlap, do not overlap, or do not contact, respectively, the previously applied strands of the other components.

This passage clearly teaches that the hardener can be applied on top of the resin, as the strands can overlap. Hence the rejection under §112 should be reversed.

H. Separate patentability of claims 56, 57 and 58

Claim 56 recites that the hardener is free from filler. Claim 57 recites that the hardener comprises a filler in an amount of less than 15% by weight, and claim 58 recites filler in an amount of less than 10% by weight. Laminated structures containing these amounts of filler all show unexpectedly low delamination rates, as summarized in Example 1 of appellants' specification (page 6, line 26 *et seq.* of the PCT application). In that example, kaolin, a commonly used filler, was added to a hardener in amounts of 5, 15 and 30% by weight. Another laminated beam was constructed using hardener having no filler. As can be seen from the Table accompanying Example 1, when no filler was added, there was no delamination. Even when 15% filler is added, the level of delamination was at an acceptable rate of 6.1%. However, at 30% filler addition, delamination rate was very high at a rate of 24%. This rate is unacceptable, and demonstrates a heretofore unknown phenomenon, namely, that high amounts of filler in amino resin gluing systems can have an adverse effect on delamination rate. Hence even if a *prima facie* case of obviousness were established with respect to claims 56-58, the showing of unexpected results in appellants' specification would overcome it, and claims 56-58 are patentable.

As previously notes, during prosecution, the Examiner suggested that he would "consider" patentability if experiments similar to appellants' Example 1 were performed on the compositions taught by Andersson, presumably showing that such unexpectedly low delamination rates would *not* occur using Andersson's adhesive system. It is appellants' position, however, that such experiments are not germaine to patentability.

Andersson provides no teaching or suggestion that the level of filler is of any significance in delamination rate, regardless of the adhesive system used. Hence it could be argued that even if appellants had claimed the *same* adhesive system as Andersson, they could in theory have demonstrated patentability by showing unexpected results in using different filler levels. Given this, it is not understood how or why a demonstration that delamination rates do *not* differ with the level of filler in Andersson's adhesive system render appellants' invention patentable.

For the above reasons, it is respectfully requested that the rejections be reversed.

1217 King Street
Alexandria, VA 22314
(703) 299-0035 telephone
(703) 299-0036 facsimile

Date: 09/07/2007

Respectfully submitted,

WRB-IP LLP

By: _____
David J. Serbin
Registration No. 30,589

VIII. Claims Appendix

1-38 (Cancelled)

39. A method of applying an amino resin gluing system to a substrate, comprising the steps of:

(a) feeding an amino resin component to at least a first orifice;

(b) feeding a hardener component to at least a second orifice; and

(c) discharging said resin and hardener components through said respective first and second orifices in the form of strands or as a spray onto the substrate, said discharged components remaining physically isolated from each other until at least one of said components contacts said substrate;

wherein the hardener comprises a volatile acid and is either free from filler or includes filler in an amount of less than 20% by weight.

40. A method according to claim 39, wherein the resin component is applied in the form of strands, and thereafter the hardener component is applied by means of spraying.

41. A method according to claim 39, wherein the components of the gluing systems are separately applied in the form of strands, and in optional order, onto the substrate.

42. A method according to claim 39, wherein the later applied strands of one component substantially overlap the corresponding previously applied strands of the other component.

43. A method according to claim 39, wherein the hardener component is applied in the form of strands on top of the resin component applied in the form of strands.

44. A method according to claim 39, wherein the later applied strands of one component do not overlap the corresponding previously applied strands of the other component.

45. A method according to claim 39, wherein the later applied strands of one component do not contact the corresponding previously applied strands of the other component.

46. A method according to claim 39, wherein the hardener comprises formic acid in an amount of 10-30% by weight.

47-55. (Cancelled)

56. A method according to claim 39, wherein the hardener is free from filler.

57. A method according to claim 39, wherein the hardener comprises a filler in an amount of less than 15% by weight.

58. A method according to claim 39, wherein the hardener comprises a filler in an amount of less than 10% by weight.

59. A method according to claim 39, wherein the hardener comprises a thickener.

60. A method of separate application of resin and hardener components of an amino resin gluing system onto a substrate, in the form of strands, wherein the hardener comprises a volatile acid and is either free from filler or comprises filler in an amount of less than 20% by weight, and wherein the resin and hardener components are discharged from different hollow members each having a plurality of orifices, the orifices of one said hollow member being either aligned in, or parallel displaced in, a machine direction in relation to the corresponding orifices of the other said hollow member.

61. A method according to claim 60, wherein the later applied strands of one component substantially overlap the corresponding previously applied strands of the other component.

62. A method according to claim 60, wherein the hardener component is applied in the form of strands on top of the resin component applied in the form of strands.

63. A method according to claim 60, wherein the later applied strands of one component do not overlap the corresponding previously applied strands of the other component.

64. A method according to claim 60, wherein the later applied strands of one component do not contact the corresponding previously applied strands of the other component.

65. A method according to claim 60, wherein the hardener comprises formic acid in an amount of 10-30% by weight.

66. A method according to claim 60, wherein the hardener is free from filler.

67. A method according to claim 60, wherein the hardener comprises a filler in an amount of less than 15% by weight.

68. A method according to claim 60, wherein the hardener comprises a filler in an amount of less than 10% by weight.

69. A method according to claim 60, wherein the hardener comprises a thickener.

70. A method of separate application of resin and hardener components of an amino resin gluing system onto a substrate, in the form of strands, wherein the hardener comprises a volatile acid and is either free from filler or comprises filler in an amount of less than 20% by weight, and wherein the strands of resin and the strands of hardener do not overlap.

71. A method according to claim 70, wherein the hardener comprises formic acid in an amount of 10-30% by weight.

72. A method according to claim 70, wherein the hardener is free from filler.

73. A method according to claim 70, wherein the hardener comprises a filler in an amount of less than 15% by weight.

74. A method according to claim 70, wherein the hardener comprises a filler in an amount of less than 10% by weight.

75. A method according to claim 39, wherein the hardener component further comprises a thickener.

76. A method of separate application of resin and hardener components of an amino resin gluing system onto a substrate, wherein the hardener comprises a volatile acid and a thickener, and is either free from filler or comprises filler in an amount of less than 20% by weight, and wherein the components of the gluing system are applied in the form of strands or by means of spraying, or any combination thereof, in optional order of application.

77. A method according to claim 76, wherein the resin component is applied in the form of strands, and thereafter the hardener component is applied by means of spraying.

78. A method according to claim 76, wherein the components of the gluing systems are separately applied in the form of strands, and in optional order, onto the substrate.

79. A method according to claim 76, wherein the later applied strands of one component substantially overlap the corresponding previously applied strands of the other component.

80. A method according to claim 76, wherein the hardener component is applied in the form of strands on top of the resin component applied in the form of strands.

81. A method according to claim 76, wherein the later applied strands of one component do not overlap the corresponding previously applied strands of the other component.

82. A method according to claim 76, wherein the later applied strands of one component do not contact the corresponding previously applied strands of the other component.

83. A method according to claim 76, wherein the hardener comprises formic acid in an amount of 10-30% by weight.

84. A method according to claim 76, wherein the hardener is free from filler.

85. A method according to claim 76, wherein the hardener comprises a filler in an amount of less than 15% by weight.

86. A method according to claim 76, wherein the hardener comprises a filler in an amount of less than 10% by weight.

87. A hardener composition for use in a method of separate application of resin and hardener components of an amino resin gluing system onto a substrate, wherein the hardener is either free from filler or comprises a filler in an amount of less than 20% by weight and a volatile acid, wherein the components of the gluing system are applied in the form of strands or by means of spraying, or any combination thereof, in optional order of application.

88. A hardener composition according to claim 87, comprising formic acid in an amount of 10-30% by weight.

89. A hardener composition according to claim 87, wherein the volatile acid is selected from the group consisting of formic acid, acetic acid, pyrovic acid and mixtures thereof.

90. A hardener composition according to claim 87, comprising a filler in an amount of less than 15% by weight.

91. A hardener composition according to claim 87, comprising a filler in an amount of less than 10% by weight.

92. A hardener composition according to claim 87, which is free from filler.

93. A hardener composition according to claim 87, comprising a thickener.

94. A method of separate application of resin and hardener components of an amino resin gluing system onto a substrate, wherein the hardener comprises a volatile acid and a thickener, wherein the later applied strands of one component substantially overlap the corresponding previously applied strands of the other component, wherein the hardener component is applied on top of the resin component, wherein the volatile component of said hardener comprises formic acid in an amount of 10-30% by weight, and wherein the hardener is free from filler.

IX. Evidence Appendix
None

X. Related Proceedings Appendix
None

XI. Copy of WO 99/67028

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 :
B05D 1/34, C09J 5/04

A1

(11) International Publication Number: **WO 99/67028**

(43) International Publication Date: 29 December 1999 (29.12.99)

(21) International Application Number: PCT/SE99/01084

(22) International Filing Date: 16 June 1999 (16.06.99)

(30) Priority Data:

9802223-9	22 June 1998 (22.06.98)	SE
9802222-1	22 June 1998 (22.06.98)	SE
9802224-7	22 June 1998 (22.06.98)	SE
60/091,440	1 July 1998 (01.07.98)	SE
60/091,438	1 July 1998 (01.07.98)	US
60/091,442	1 July 1998 (01.07.98)	US
9803549-6	16 October 1998 (16.10.98)	SE
9803550-4	16 October 1998 (16.10.98)	SE
9803551-2	16 October 1998 (16.10.98)	SE

(71) Applicant *(for all designated States except US)*: AKZO NOBEL N.V. [NL/NL]; P.O. Box 9300, NL-6800 SB Arnhem (NL).

(71) Applicant *(for SE only)*: CASCO PRODUCTS AB [SE/SE]; P.O. Box 11538, S-100 61 Stockholm (SE).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: NASLI-BAKIR, Benyahia [SE/SE]; Centralvägen 4D, S-132 40 Saltsjö-Boo (SE). LINDBERG, Stefan [SE/SE]; Lagmansvägen 33, S-186 42 Vallentuna (SE). JANACKOVIC, Anna [SE/SE]; Älta Idrottsväg 10, S-138 33 Älta (SE).

(74) Agent: NYANDER, Johan; Eka Chemicals AB, Patent Dept., P.O. Box 11556, S-100 61 Stockholm (SE).

(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published

With international search report.

Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: METHOD OF APPLICATION

(57) Abstract

A method of separate application of resin and hardener components of an amino resin gluing system onto a substrate, characterized in that the hardener comprises a volatile acid, and optionally a filler in an amount of less than 20 % by weight, wherein the components of the gluing system are applied in the form of strands or by means of spraying, or any combination thereof, in optional order of application. The invention also relates to a hardener composition for use in the method and to a device suitable for carrying out the method.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	**ES**	Spain	**LS**	Lesotho	**SI**	Slovenia
AM	Armenia	**FI**	Finland	**LT**	Lithuania	**SK**	Slovakia
AT	Austria	**FR**	France	**LU**	Luxembourg	**SN**	Senegal
AU	Australia	**GA**	Gabon	**LV**	Latvia	**SZ**	Swaziland
AZ	Azerbaijan	**GB**	United Kingdom	**MC**	Monaco	**TD**	Chad
BA	Bosnia and Herzegovina	**GE**	Georgia	**MD**	Republic of Moldova	**TG**	Togo
BB	Barbados	**GH**	Ghana	**MG**	Madagascar	**TJ**	Tajikistan
BE	Belgium	**GN**	Guinea	**MK**	The former Yugoslav Republic of Macedonia	**TM**	Turkmenistan
BF	Burkina Faso	**GR**	Greece			**TR**	Turkey
BG	Bulgaria	**HU**	Hungary	**ML**	Mali	**TT**	Trinidad and Tobago
BJ	Benin	**IE**	Ireland	**MN**	Mongolia	**UA**	Ukraine
BR	Brazil	**IL**	Israel	**MR**	Mauritania	**UG**	Uganda
BY	Belarus	**IS**	Iceland	**MW**	Malawi	**US**	United States of America
CA	Canada	**IT**	Italy	**MX**	Mexico	**UZ**	Uzbekistan
CF	Central African Republic	**JP**	Japan	**NE**	Niger	**VN**	Viet Nam
CG	Congo	**KE**	Kenya	**NL**	Netherlands	**YU**	Yugoslavia
CH	Switzerland	**KG**	Kyrgyzstan	**NO**	Norway	**ZW**	Zimbabwe
CI	Côte d'Ivoire	**KP**	Democratic People's Republic of Korea	**NZ**	New Zealand		
CM	Cameroon			**PL**	Poland		
CN	China	**KR**	Republic of Korea	**PT**	Portugal		
CU	Cuba	**KZ**	Kazakstan	**RO**	Romania		
CZ	Czech Republic	**LC**	Saint Lucia	**RU**	Russian Federation		
DE	Germany	**LI**	Liechtenstein	**SD**	Sudan		
DK	Denmark	**LK**	Sri Lanka	**SE**	Sweden		
EE	Estonia	**LR**	Liberia	**SG**	Singapore		

METHOD OF APPLICATION

According to the present invention there is provided a method of separate application of a gluing system, comprising an amino resin and hardener components, onto a substrate. The present invention also provides a hardener composition comprising a volatile acid, which can be used in the method and a device for carrying out the method.

The resin component, preferably in the form of strands, is preferably applied first, whereupon the hardener component is applied. The method can, for example, be employed in the production of gluelam or laminated timber.

Separate application of the components of a gluing system onto a substrate, such as, for example, a piece of wood, is known in the art, and places certain restrictions on the characteristics of the components used. By keeping the different components, often only resin and hardener components, separated in the application device, many advantages are offered, as is known in the art. From the viewpoint of, interalia, pot life, operation, and cleaning, separate application of the components of a gluing system is preferred over the application of a mixture of said components.

In EP 0 362 742 separate application of, interalia, amino resin gluing systems to wooden parts is suggested, by means of curtain application of both the components, or of one component, and strand application of the other. However, there is no indication of a preferred order of application of said components. In the example given, only a phenol-resorcinol-formaldehyde resin gluing system was used.

WO 97/29161 is concerned with a two-component glue system for the production of laminated wood panels, and only in general terms mentions separate application of melamine glues. Neither a particular method nor a specific order of application of the components is suggested. The hardener component used contains 20-40 % by weight of an inorganic filler.

However, in practice, it has now been found that for separate application, when only a small amount of hardener is used, as is often the case, curtain application is difficult to realise with a good gluing result, since it is hard to secure the accomplishment of a continuous and uniform curtain formed of only a relatively small flow, possibly leading to an impaired gluing result and glue joints having reduced strength. Additionally, the curtain is easily affected by even small wind blows. Moreover, it has also been found that a high amount of filler in the hardener component, such as 20-40 % by weight, inhibits the achievement of an adequate blending of the applied components on the substrate.

Furthermore, technical solutions are still sought for the need to find simple application systems for separate application of the components of a gluing system, which can be adjusted to the gluing system in question and the desired assembly times. By assembly time it is meant the time that lapse from the moment of application of a gluing system onto a substrate to the moment of pressing the substrates to be glued together.

Accordingly, the present invention provides a method of application of an amino resin gluing system, a hardener composition suitable for use in the method and a device suitable for carrying out the method, by which the above-mentioned problems are overcome.

The method according to the invention is defined in the appended claims. It comprises separate application of resin and hardener components of an amino resin gluing system onto a substrate, wherein the hardener comprises a volatile acid, and optionally a filler in an amount of less than 20% by weight and the components of the gluing system are applied in the form of strands or by means of spraying, or any combination thereof, in optional order of application.

The amino resin used in the method of the invention can be any amino resin, such as, for example, urea-formaldehyde, melamine-urea-formaldehyde, melamine-formaldehyde, melamine-urea-phenol-formaldehyde resin, and furfuryl alcohol modified varieties thereof, the preferred resin being melamine-urea-formaldehyde.

According to the method, an amino resin, and a suitable hardener is applied separately to wooden substrates. In the method, the resin component is preferably applied first in the form of strands, whereupon the hardener is applied in the form of strands, or alternatively, is applied by means of spraying. By use of the preferred order of application according to the invention, any damages to the substrate, such as wood, due to the hardener composition is minimised.

Depending on the reactivity of the components in the gluing system, the desired assembly times, special considerations about substrate damaging by the acid used in the hardener and emission of vapour of the acid into the surrounding atmosphere, such as, in the working environment, the later applied strands may overlap, do not overlap, or do not contact, respectively, the corresponding previously applied strands of the other components.

As used here, the term "strand" also comprehends the meaning of the term "ribbon", also conventionally used in the art, and any other like term.

A hardener composition is also provided according to the present invention as defined in the appended claims, for use in combination with amino resin gluing systems.

The hardener composition can be used in the method of the present invention in order to make the gluing system faster curing, and to obtain joints endowed with higher strength.

As an essential constituent of the hardener component of amino resin gluing systems, an acid is included. When aggressive acids are used, remaining acid in the glued product might cause detrimental effects to the substrate or joint, reducing the strength of the substrate and/or the joint, and/or discoloration of the substrate by the acid, which is highly undesirable.

Thus, the hardener composition according to the present invention comprises a volatile acid, which can readily be evaporated so that no detrimental amounts of acid will remain in the resulting glue joint, and which also allows for relatively large amounts of acid (and thus hardener) to be used in order to obtain a fast-curing system, if desired.

The device according to the invention is defined in the appended claims and can be used for carrying out the method, wherein the components of the gluing system are applied in the form of strands into a substrate.

According to the method of the invention, the hardener component can also be applied first, followed by the resin component, while the preferred order of application being the hardener component first, followed by the resin component.

Besides the volatile acid, the present hardener can also comprise water, thickener, resorcinol, and, optionally, a relatively low amount of filler.

The hardener can either be free from filler, or alternatively contain a filler in an amount, for example, suitably of at least 1 % by weight and preferably of at least 5 %.

The hardener composition to be used in the method according to the invention comprises:

- up to 50% by weight of a volatile acid, suitably 5-30 %, preferably 10-30 % and most preferably 10-25 %, and
- suitably less than 20% by weight of a filler, preferably less than 15 % and most preferably less than 10 %.

The amount of filler used, if any, can be determined as suitable under the specific circumstances from time to time. However, as shown in Example 1, hereinafter, the strength of the resulting joint appears to be reduced with higher amounts of filler.

Suitable fillers include, for example, kaolin.

As used here, the term "volatile acid" is to be understood as meaning; having a low boiling point, and/or having a low vapour pressure at room temperature. Said acids should suitably have a vapour pressure of less than 10 mm Hg at a temperature of up to 60 °C.

Suitable acids are, for instance, organic and inorganic acids, whereby the organic acids are preferred. Preferred organic acids include, for example, formic acid, acetic acid and pyrovic acid. Suitable inorganic acid include, for example, hydrochloric acid. Preferably formic acid may be used.

A high proportion of acid makes the gluing system faster-curing. By using volatile acid, which easily can be evaporated, a relatively larger amount of hardener in relation to resin can be used, such as a weight ratio of hardener to resin, for example, of about 1:6-1:1, suitably 1:4-1:1, preferably 1:3,5-1:2, leading to a higher-strength joint and a faster-curing system, as shown in Example 2, hereinafter.

Accordingly, in a preferred embodiment, the hardener composition comprises a relatively low filler content, a relatively high volatile acid content and a relatively high weight ratio of hardener to resin, as defined herein.

In the method of the present invention, the resin and hardener components can be applied in any order in the form of strands or by means of spraying, more suitably, the resin and hardener are applied in the form of strands, or, alternatively, the hardener component can be applied by means of spraying and the resin in the form of strands, wherein the hardener in either case preferably is applied following the application of the resin. Preferably they are both applied in the form of strands.

Depending on the reactivity of the components of the gluing system and the desired assembly time, the strands of the different components, such as the hardener and the resin, can be applied in relation to each other in various suitable ways. Thus, for low reactive/slow curing gluing systems, and/or short assembly times, it is suitable that the later applied strands of one component overlap the corresponding strands of the previously applied component(s), or they are applied adjacent to each other so that they are in essentially contact with each other. When high reactive/fast curing gluing systems are used, and/or long assembly times are desired, it is suitable that the later applied strands of one component are applied with a certain distance in relation to the corresponding strands of the previously applied component(s). For assembly times of about 60-120 min a distance of about 4-8 mm between the strands of the different components of the gluing system, such as the hardener and the resin, is suitable, for assembly times of about 15-60 min a distance of about 2-4 mm is preferred, and for assembly times of about up to 15 min overlapping of the strands or essentially contact between them is preferred.

However, when the avoidance of the contact of the hardener component with the substrate is of primary concern, such as, for instance, for protection of the substrate from the resin component, the resin component should desirably be applied so that the

strands will form a continuous layer on the substrate, on top of which the hardener subsequently is applied in the form of strands, or by means of spray application.

In the case of application in the form of strands of both components, it is preferred that the hardener is applied on top of the resin strands, whereby any undesired contact of the hardener with the substrate can be prevented, and admixing of the components is enhanced.

Accordingly, in one embodiment of the method of the present invention, the hardener is applied on top of the resin strands. In this embodiment it is conceivable even to use hardeners, or hardeners having constituent(s), from which the substrate desirably should be protected, without damaging the substrate or impairing the strength of the resulting glue joint.

In this manner the substrate is protected from direct contact with the hardener, which is often highly desirable. The direct contact of the acid in the hardener, applied on top of the resin component on a first piece of substrate, with another piece to be glued together with the first one, is limited to a certain extent by the fact that some of the acid will have diffused, or migrated, into the resin component at the point of time when the pieces are brought together and pressed. This method allows for relatively large quantities of volatile acid to be employed.

The opposite order of application, i.e., the hardener first, is also possible, although not preferred. This order of application can, for example, be used where it is desirable to avoid or minimise any emission of vapour of the acid into the surrounding atmosphere, such as, in the working environment, especially if the acid used is not detrimental to the specific substrate. This order of application could also be advantageous, e.g., in the case where an expandable gluing system is used, in order to prevent the generated gas from escaping into the atmosphere.

Moreover, if it is desired or required, the hardener may be divided in one or more strands, which may have different compositions with reference to the amounts of volatile acid and filler, and be applied separately.

A suitable device which can be used in the method according to the present invention for the application in the form of strands of both the components, is a device comprising a unit of at least two hollow members, at least one member for each component, provided with a number of orifices in each member designed to apply the respective component onto a substrate, below said hollow members, to form strands, the hollow members being positioned above the plane of application, wherein each of the orifices of one hollow member are aligned in the machine direction in relation to the corresponding orifices of the other hollow member(s). This device enables application of